

Claims

1. Arrangement of a front gate (27) on a vehicle, having at least one hinge device (1) that lies in the rear, viewed in the direction of travel, in the form of a four-bar mechanism (3, 4) having a long and a short arm, whereby the front gate (27) can be pivoted during normal opening and closing, by means of the hinge device (1), and can be raised in the rear region in the case of a collision of the vehicle,

characterized in that

the hinge device (1) has an energy accumulator (2) that activates a displacement device (17, 28) in the case of a collision of the vehicle, which device in turn acts directly on the front gate (27) and stands in a releasable connection with it, whereby the front-gate-side articulations (19) of the four-bar mechanism (3, 4) are fixed in place on a pivoting lever (15), in articulated manner, which lever is releasably fixed in place on the front gate (27) in the state of rest, with one end, and can be pivoted relative to the front gate (27) with its other end, about a rotary articulation (6) disposed on the front gate (27) in the region (18) of the articulation of the displacement device (17, 28), and the displacement device (17, 28) raises the front gate (27), guided by the arms (3, 4) of the four-bar

mechanism, and the pivoting lever (15) that is released from the front gate (27) on one side, as compared with the state of rest, in the case of a collision of the vehicle.

2. Arrangement according to claim 1, **characterized in that** the pivoting lever (15) is releasably fixed in place on the front gate (27) with its one end, in such a manner that when a force that can be predetermined, in the direction towards a change in position of the displacement device (17, 28), is exceeded, it releases its releasable connection with the front gate (27) when the energy accumulator (2) is triggered, and can be pivoted about its rotary articulation (6) disposed on the front gate (27) on the other end.
3. Arrangement according to claim 2, **characterized in that** the pivoting lever (15) can be fixed in place on the front gate (27) with one end, by way of a non-positive-lock connection (16, 14).
4. Arrangement according to claim 3, **characterized in that** the non-positive-lock connection (16, 14) is formed by means of a mechanical snap-in connection, in which a functional edge (16) on the pivoting lever (15) engages behind a counter-shape (14) disposed on the front gate side, and is locked in place with it in the normal state of rest of the front gate (27).

5. Arrangement according to claim 4, **characterized in that** the counter-shape (14) is formed on a separate component (23), which is fixed in place on the front gate (27) in movable and/or resilient manner.
6. Arrangement according to claim 5, **characterized in that** the separate component (23) can be activated by the displacement device (17, 28) triggered by the energy accumulator (2), if the displacement device (17, 28) moves out of its rest position in the case of a collision and, in this connection, releases the non-positive-lock connection (16, 14) of the pivoting lever (15) with the front gate (27).
7. Arrangement according to one of the preceding claims, **characterized in that** the front-gate-side end of the displacement device (17, 28) stands in a non-positive-lock connection with an essentially bolt-like segment (18) on the front gate (27), by way of a pan-like accommodation (17).
8. Arrangement according to claim 7, **characterized in that** the essentially bolt-like segment (18) on the front gate (27) can be raised from the pan-like accommodation (17) during normal activation of the hinge device (1) for opening the front gate (27) by means of the four-bar mechanism (3, 4).

9. Arrangement according to one of the preceding claims,  
**characterized in that** when the energy accumulator (2) is released in the case of a collision, the pan-like accommodation (17) of the displacement device (17, 28) suddenly displaces the bolt-like segment (18) on the front gate (27) in the direction towards the raised position of the front gate (27) and, in this connection, the pivoting lever (15) releases its non-positive-lock connection (16, 14) with the front gate (27), at its end that is releasably fixed in place on the front gate (27), and pivots about its rotary articulation (6), relative to the front gate (27), formed at its other end.
  
10. Arrangement according to one of the preceding claims,  
**characterized in that** the front-gate-side end of the displacement device (17, 28) is disposed and fixed in place on the vehicle body side with the pan-like accommodation (17), in the normal state of rest of the front gate (27), in such a manner that the essentially bolt-like segment (18) on the front gate (27) is accommodated in the pan-like accommodation (17).
  
11. Arrangement according to one of the preceding claims,  
**characterized in that** the rotary articulation (6) of the pivoting lever (15) on the front gate (27) and the bolt-like

segment (18) of the front gate (27) have an identical point of rotation.

12. Arrangement according to one of the preceding claims, **characterized in that** by means of the rotary movement of the pivoting lever (15), on the one hand, and the setting movement (7) of the displacement device (17, 28), on the other hand, the front gate (27) performs a pure pivoting movement about a closure device disposed on the front gate (27), on the front end of the vehicle, without a relative displacement of the front gate (27) in the longitudinal direction of the vehicle, relative to the closure device.
13. Arrangement according to one of the preceding claims, **characterized in that** the energy accumulator (2) has a biased mechanical spring, particularly a helical spring (2).
14. Arrangement according to one of the preceding claims, **characterized in that** the displacement device (17, 28) has an essentially rod-like segment (28) that is disposed in the interior of the helical spring (2), and is held in place on one end, against the force of the biased helical spring (2), and carries the pan-like accommodation (17) for the bolt-like segment (18) on the front hood (27) at its other end.

15. Arrangement according to one of the preceding claims, **characterized in that** the energy accumulator (2) is held in its biased state, in its state of rest, by means of a triggering device (9, 10, 11).
16. Arrangement according to one of the preceding claims, **characterized in that** the triggering device (9, 10, 11) can be controlled by way of an actor (10) in the case of a collision, and releases the energy accumulator (2) from its biased state with mechanical reinforcement by way of lever devices (10).
17. Arrangement according to claim 16, **characterized in that** the actor (11) has an electromechanical switch.
18. Arrangement according to one of the preceding claims, **characterized in that** the triggering device (9, 10, 11) has a hook-like (9) segment that engages behind a related segment (13) of the rod-like segment (28) of the displacement device (17, 28), and secures the displacement device (17, 28) in its position, counter to the effect of the energy accumulator (2).
19. Arrangement according to claim 18, **characterized in that** the hook-like segment (9) of the triggering device (9, 10, 11), the displacement device (17, 28), and the energy accumulator

(2) can be brought back into their starting state after the front gate (27) has been triggered, and can be activated again.

20. Arrangement according to one of the preceding claims, **characterized in that** the energy accumulator (2) has a fluid medium.
21. Arrangement according to one of the preceding claims, **characterized in that** the pivoting lever (15) and the bolt-like segment (18) are fixed in place on the front gate (27) by means of a common assembly part (5).
22. Arrangement according to one of the preceding claims, **characterized in that** the hinge device (1) can be locked in place in a raised state, as compared with the rest state, after the front gate (27) has been raised.
23. Arrangement according to claim 22, **characterized in that** at least one locking device is disposed on the pivoting lever (15) and/or on the arm or arms (3, 4), which device prevents the relative movement of pivoting lever (15) and/or arms (3, 4) in the raised state of the front gate (27).
24. Arrangement according to claim 23, **characterized in that** the at least one locking device has a cam that engages into a

corresponding counter-shape in the raised state of the front gate (27), as compared with the state of rest, and locks pivoting lever (15) and/or arms (3, 4) releasably against one another, in the raised state of the front gate (27).